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(54) Abstract Title
Vacuum cleaner

(57) An upright-type vacuum cleaner has a suction brush (50) and a cleaner body (20) having an upper dust chamber (21), a lower motor chamber (22) housing a motor, an air inflow path (25), and an air outflow path (26, 23a, 23b) interconnecting the dust chamber and the motor chamber. A cyclone body (31) is mounted in the dust chamber, and a dust barrel (37) removably mounted to a lower side of the cyclone body. The vacuum cleaner further includes a fine dust filtering portion (40) removably disposed in the air outflow path. The vacuum cleaner also includes a locking and unlocking device (6) which detaches the dust barrel (37) from the cyclone body (31). Accordingly, the user can dispose of collected contaminants and dust without having to remove the entire cyclone dust collecting apparatus (30), but rather by removing only the dust barrel (37) from the dust chamber (21).

FIG.2

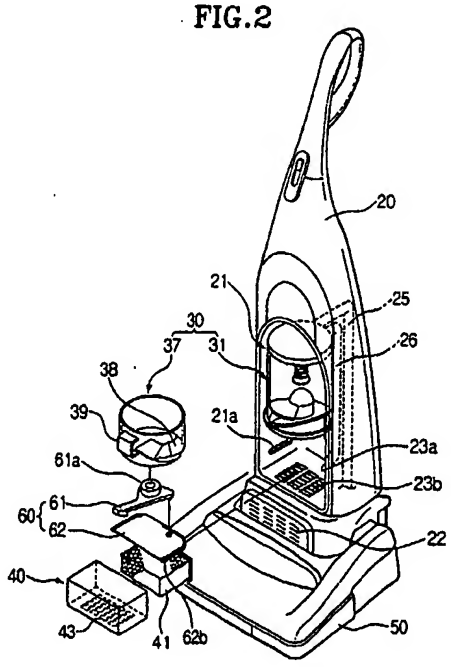

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FIG. 1

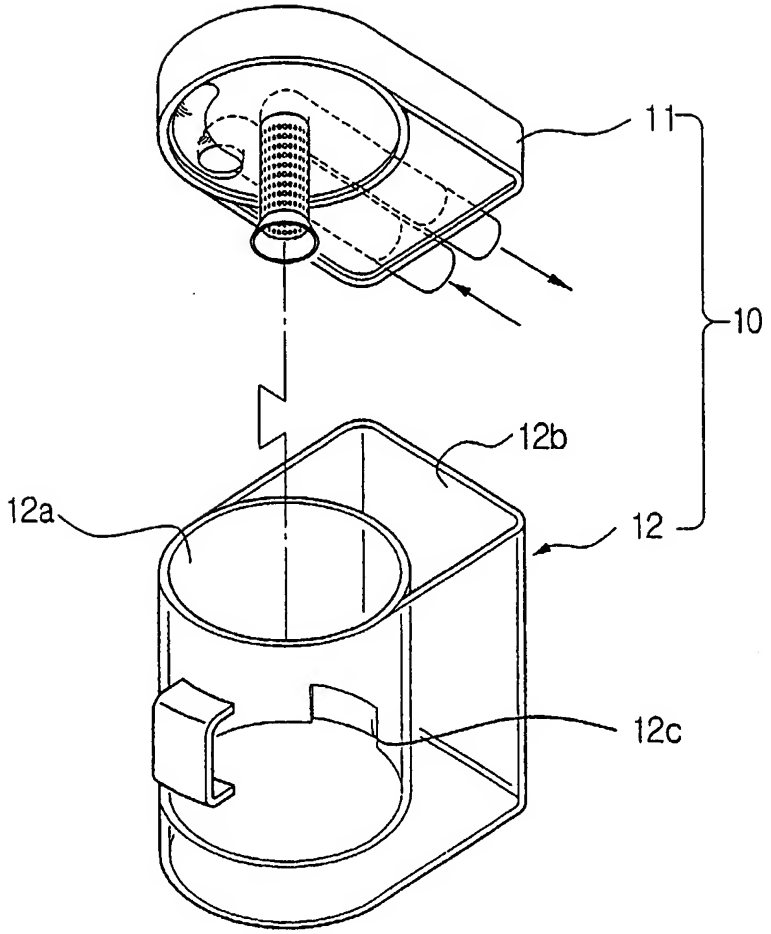


FIG.2

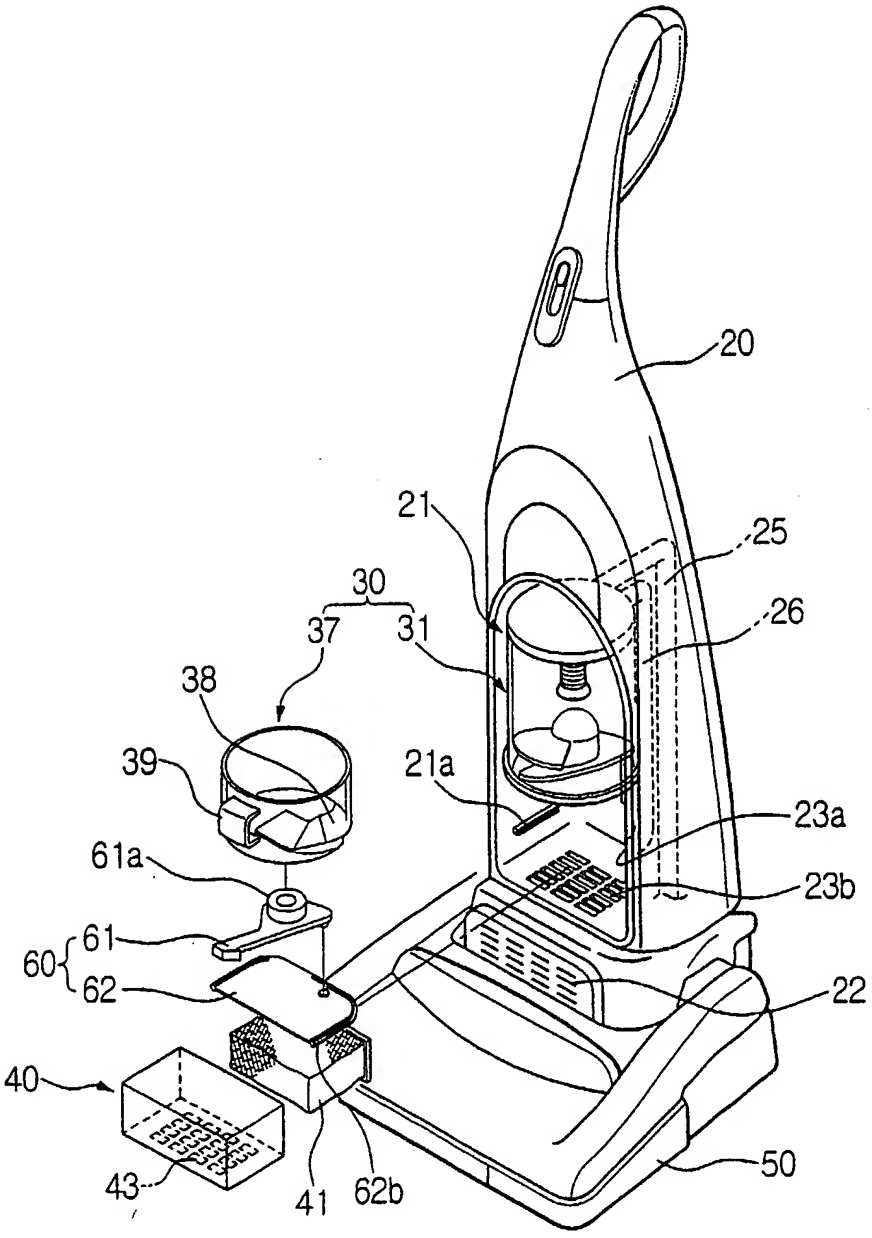


FIG.3

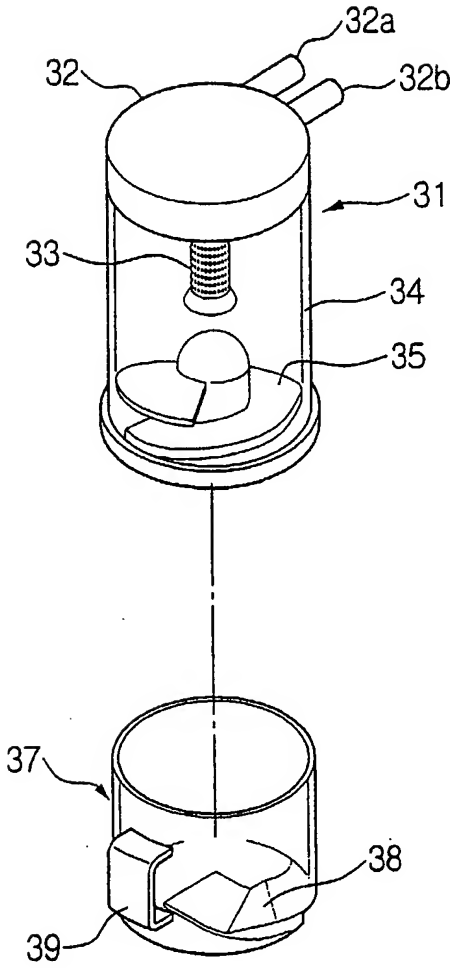


FIG.4

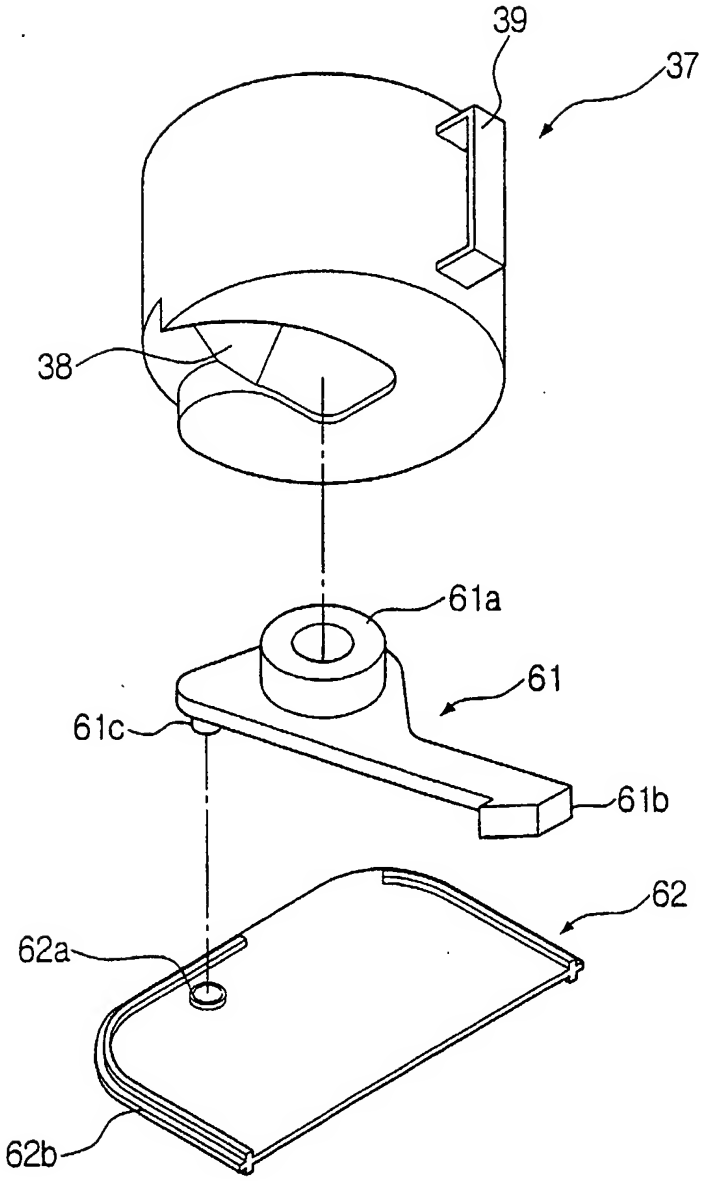


FIG.5A

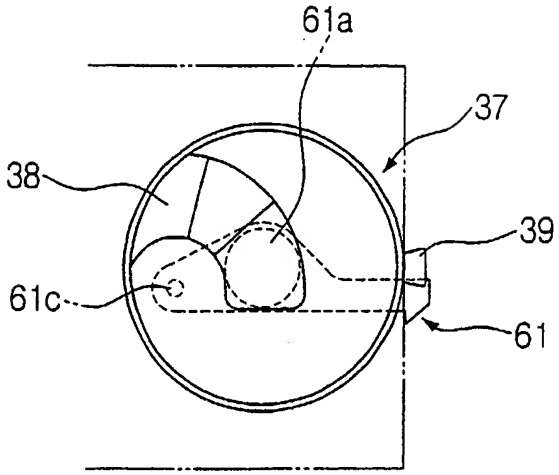


FIG.5B

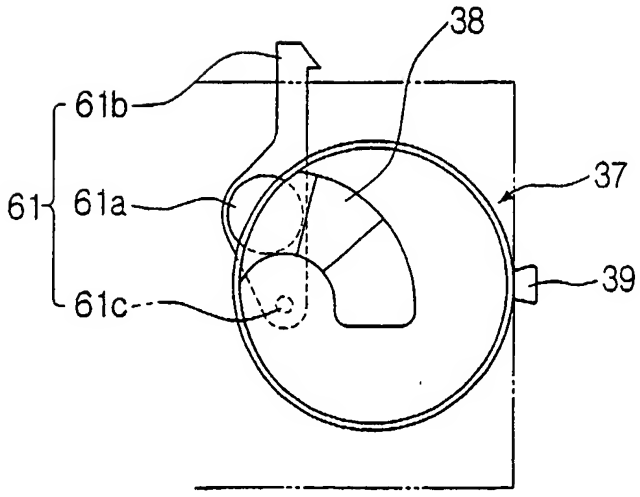
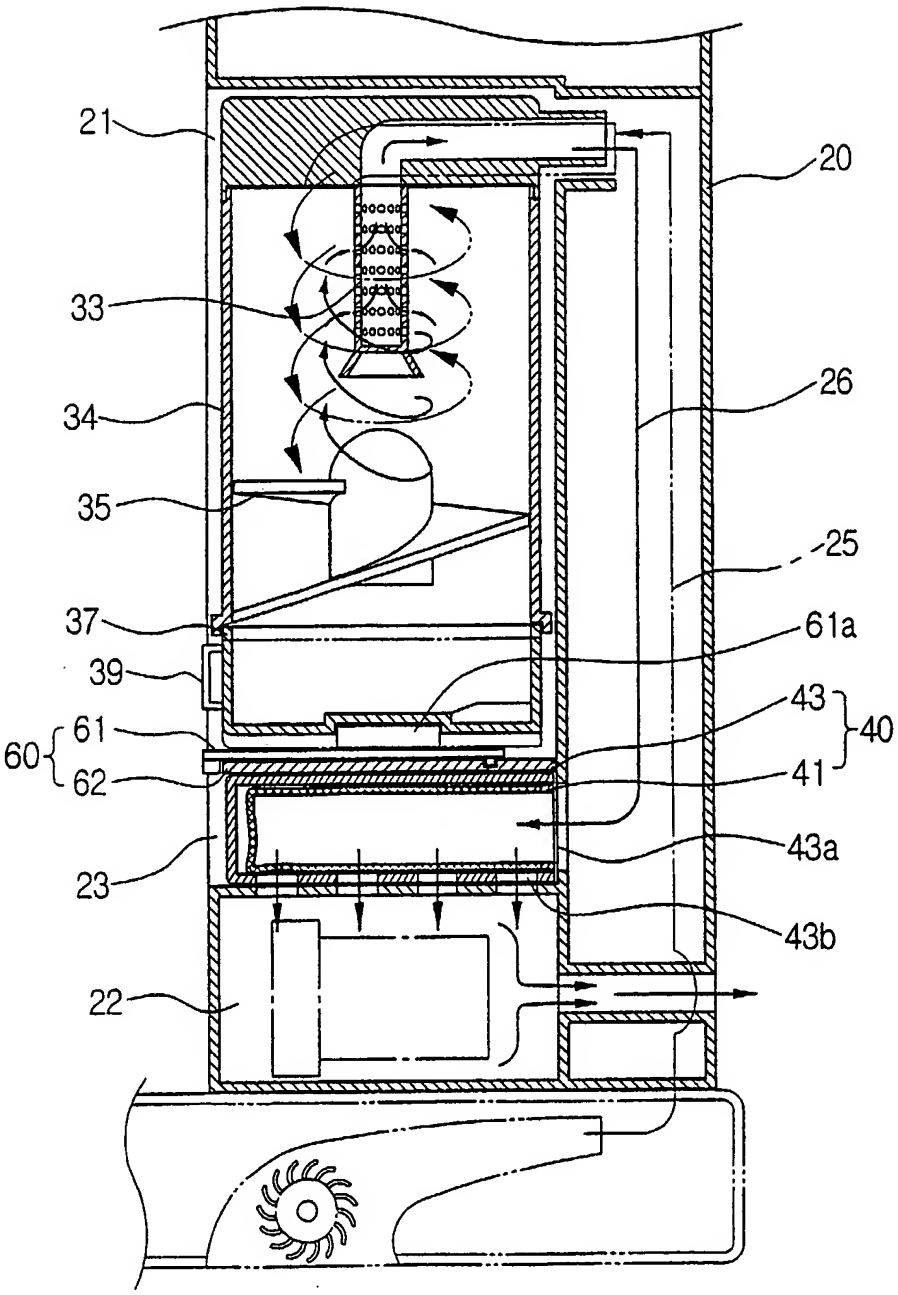


FIG.6



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VACUUM CLEANER

The present invention relates to an upright-type vacuum cleaner having cyclone dust collecting apparatus with a removable dust receptacle.

Generally, an upright-type vacuum cleaner having cyclone dust collecting apparatus has a suction brush which is connected to a cleaner body, the vacuum cleaner being moved along a surface to be cleaned, i.e. a cleaning surface. The interior of the cleaner body is divided into a dust collecting chamber, in which the cyclone dust collecting apparatus is removably installed, and a motor driving chamber, in which a motor is installed. During operation, the motor generates a strong suction force at the suction brush. The suction force draws air and contaminants on the cleaning surface, into the cleaner body. After being drawn in through the suction brush, the air and contaminants are drawn into the cyclone dust collecting apparatus which is installed in the dust collecting chamber of the cleaner body. The cyclone dust collecting apparatus guides the air into a vortex which whirls at a high speed. The vortex of air produces a centrifugal force which causes the contaminants to be separated from the air. The contaminants are then collected in the cyclone dust collecting apparatus, and the clean air is discharged out through the motor driving chamber.

As shown in Figure 1, the cyclone dust collecting apparatus 10 includes a cyclone body 11 and a cyclone housing 12. The cyclone housing 12 includes a centrifugal separating chamber 12a and a dust barrel 12b. The centrifugal separating chamber 12a has an opening which interconnects the centrifugal chamber 12a with the dust barrel 12b. Accordingly, the air drawn into the cyclone body 11 forms the vortex in the centrifugal separating chamber 12a. Due to the centrifugal force of the vortex, the contaminants are separated from the air, and guided into the dust barrel 12b via the opening 12c. Thus, the contaminants are collected in the dust barrel 12b.

The process of emptying the cyclone dust collecting apparatus 10 of this upright-type vacuum cleaner, when it becomes full with contaminants, for example dust, will be

described below. First, the cyclone dust collecting apparatus 10 is removed from the dust chamber. Next, the cyclone housing 12, which holds the contaminants and dust, is separated from the cyclone body 11 of the cyclone dust collecting apparatus 10. The user then removes the contaminants and dust, from the dust barrel 12b of the cyclone housing 12, into a dustbin.

According to a first aspect of the present invention, an upright-type vacuum cleaner comprises: a cleaner body having an upper dust chamber, a lower motor driving chamber housing a motor, an air inflow path, and an air outflow path interconnecting the upper dust chamber and the lower motor driving chamber; a cyclone body mounted in an upper portion of the dust chamber and being connected to the air inflow path and the air outflow path; a dust barrel removably mounted to a lower side of the cyclone body; a suction brush mounted on a lower portion of the cleaner body, and arranged to be movable along a surface to be cleaned; and fine dust filtering means removably disposed in the air outflow path.

According to a second aspect of the present invention, an upright-type vacuum cleaner comprises: a cleaner body including a dust chamber, a motor driving chamber, an air inflow path, and an air outflow path, the air outflow path connecting the dust chamber with the motor driving chamber; a suction brush pivotally coupled to the cleaner body; a cyclone body mounted in the dust chamber, the cyclone body being in communication with the air inflow path and the air outflow path, and including a head portion and a cover, the head portion including a grille extending toward a closed end of the cover, the closed end of the cover having a spiral surface forming a contaminant discharge port; and a removable dust barrel coupled to the closed end of the cyclone body.

According to a third aspect of the present invention, an upright-type vacuum cleaner comprises: a cleaner body housing a cyclone body and a particle receptacle; a suction port for movement across a surface to be cleaned; a motor for generating a suction force at the suction port and interconnected to the cyclone body by means of an inlet channel and an outlet channel, wherein the motor and the inlet channel are arranged to cause air and particles to be drawn from the suction port into the cyclone body via the inlet

channel, wherein the cyclone body is arranged substantially to separate the particles from the air for collection in the particle receptacle, wherein the outlet channel is arranged to expel the air from the cyclone body, and wherein the particle receptacle is detachable from the cyclone body whilst the cyclone body is housed within the cleaner body.

The upright-type vacuum cleaner described in this specification has cyclone dust collecting apparatus enabling the user to dump or discharge contaminants collected therein easily, without separating the entire cyclone dust collecting apparatus from the vacuum cleaner before separating the dust barrel from a cyclone housing. The user need only remove the dust barrel, which holds the contaminants, from the vacuum cleaner in order to dispose of the contents in the dust barrel.

The vacuum cleaner may include a cleaner body having an upper dust chamber, a lower motor driving chamber housing a motor, and an air inflow path and an air outflow path for interconnecting the upper dust chamber and the lower motor driving chamber. The vacuum cleaner may further include a cyclone body mounted in an upper portion of the dust chamber, and a dust barrel removably mounted on a lower side of the cyclone body. The cyclone body can be connected with the air inflow path and the air outflow path. A suction brush, mounted on a lower portion of the cleaner body, may be movable along a cleaning surface. The vacuum cleaner can further include fine dust filtering means removably disposed on the air inflow path and the air outflow path.

The cyclone body may include a cover having an open end and a closed end, and a contaminant discharge port formed in the closed end. The cyclone body may also include head portion having an air inflow pipe connected to the air inflow path for guiding the air in a diagonal direction with respect to the cover, (i.e. so as to impart a rotational air flow) an air outflow pipe having one end connected to a grille that extends toward the closed end of the cover and is connected to the air outflow path.

The closed end of the cover preferably includes a spiral surface. Also, the dust barrel may be substantially cylindrical in shape and has an open end and a closed end. The open end of the dust barrel may align with the closed end of the cyclone body.

The invention will now be described, by way of example, with reference to the accompanying drawings, in which:

Figure 1 is a perspective view of cyclone dust collecting apparatus employed in a conventional upright-type vacuum cleaner;

Figure 2 is a perspective view of an upright-type vacuum cleaner including cyclone dust collecting apparatus in accordance with the present invention;

Figure 3 is an exploded perspective view of the cyclone dust collecting apparatus shown in Figure 2;

Figure 4 is an exploded perspective view of locking/unlocking means for the cyclone dust collecting apparatus of Figure 2;

Figures 5A and 5B are, respectively, cross-sectional views showing the operation of the locking/unlocking means of Figure 2; and

Figure 6 is a partial cross-sectional view of the upright-type vacuum cleaner of Figure 2.

Referring to Figure 2, an upright vacuum cleaner includes a cleaner body 20, a suction brush 50 mounted on a lower side of the cleaner body 20, cyclone dust collecting apparatus 30 removably mounted in the cleaner body 20, and filtering means 40 for filtering fine dust and contaminants.

The cleaner body 20 includes a dust chamber 21 for housing the cyclone dust collecting apparatus 30, a motor driving chamber 22 for housing a motor (not shown), and a filter

chamber 23 for housing the filtering means 40. The cyclone dust collecting apparatus 30 is connected to one end of an inflow path 25, formed in the cleaner body 20, and also to one end of a discharge path 26. The other end of the inflow path 25 is in communication with the suction brush 50. Accordingly, air and contaminants entrained or mixed in the air are drawn from the surface to be cleaned into the cyclone dust collecting apparatus 30, through the inflow path 25. The other end of the discharge path 26 is connected to the motor driving chamber 22. The filter chamber 23 is provided in the discharge path 26. Accordingly, when air is discharged from the cyclone dust collecting apparatus 30, it flows through the discharge path 26, the filter chamber 23, and the motor driving chamber 23, to the outside. The filter chamber 23 includes an air inlet 23a, corresponding to the discharge path 26, and an air outlet 23b, corresponding to the motor driving chamber 22. The air inlet 23a is formed on an inner side of the filter chamber 23, while the air outlet 23b is formed on the bottom of the filtering chamber 23.

The suction brush 50 is mounted on a lower side of the cleaner body 20 and is movable along the cleaning surface. The vacuum cleaner motor, which is in the motor driving chamber 22, generates a suction force, such that the suction brush draws in the ambient air together with fine dust and contaminants from the cleaning surface. It is preferable that the suction brush 50 is movably mounted on the cleaner body 20.

The cyclone dust collecting apparatus 30 includes a cyclone body 31 and a dust barrel 37. Figure 3 is a more detailed illustration of the cyclone dust collecting apparatus 30. The cyclone body 31 includes a head portion 32 and a cover 34. The head portion 32 includes an inflow pipe 32a which is connectable to the inflow path 25, a discharge pipe 32b connectable to the discharge path 26, and a grille 33 for filtering the dust or contaminants. The head portion 32 is connected to an upper end of the cover 34. While one end of the inflow pipe 32a is connected to the inflow path 25, the other end of the inflow pipe 32a is formed so as to discharge air in a generally diagonal direction, with respect to the cover 34. The grille 33 is substantially cylindrical in shape and extends down towards a closed end of the cover 34. The grille 33 has a plurality of fine holes formed in its surface.

The cover 34 is also substantially cylindrical in shape and has an open end and a closed end. A contaminant discharge port is formed in the closed end of the cover 34. The contaminant discharge port may be an opening of a predetermined size and is preferably defined by a spiral surface 35 along which the contaminants can be discharged to the dust barrel 37 in a smooth manner. A starting edge and an ending edge of the spiral surface 35 may be arranged so as to be at the same point or plane, or the starting side may overlap a certain area of the ending side.

Here, it is preferable that the cyclone body 31 is secured to the dust chamber 21, by means of a separate fastening member (not shown).

The dust barrel 37 is substantially cylindrical in shape and has an open end and a closed end. The open end of the dust barrel 37 aligns with the closed end of the cyclone body 31. It is preferable that a handle 39 is formed on a sidewall of the dust barrel 37, to facilitate handling.

Referring back to Figure 2, the filtering means 40 includes an air filter 41 and a filter casing 43. The air filter 41 is formed of a material having a plurality of fine holes to filter fine dust particles, which were not separated-out by the cyclone dust collecting apparatus 30. Any conventional air filter for a vacuum cleaner may serve the function of this air filter 41, and accordingly, the detailed description thereof is omitted. The filter casing 43 houses the air filter 41 and is removably disposed in the filter chamber 23. The filter casing 43 includes an inflow port 43a (see Figure 6) which is connected to the discharge path 26, and an outflow port 43b (see Figure 6) which is connected to the motor driving chamber 22. Accordingly, the inflow port 43a of the filter casing 43 corresponds to the air inlet 23a of the filtering chamber 23, while the outflow port 43b thereof corresponds to the air outlet 23b.

The dust chamber 21 includes a locking/unlocking means 60 for mounting and removing the dust barrel 37 from the cyclone dust collecting apparatus 30. The locking/unlocking means 60, which is best illustrated in Figure 4, includes a slanted

recess 38 formed on a lower end of the dust barrel 37, a fixing member 61 having a protrusion 61a that is received in the slanted recess 38, and a base 62 for supporting fixing member 61, and the cyclone dust collecting apparatus 30. The base 62 supports the fixing member 61 for allowing movement of the fixing member 61 with respect to the slanted recess 38.

The slanted recess 38 is formed in a spiral manner and has a depth which gradually increases from a centre region of the lower end of the dust barrel 37, to an outer edge of the lower end.

The fixing member 61 includes a rotary pin 61c, a rotary handle 61b and the protrusion 61a. The rotary pin 61c is formed on one end of the fixing member 61 and serves as a pivot. The rotary handle 61b is formed at the other end of the fixing member 61, and the protrusion 61a is located between the two ends of the fixing member. The protrusion 61a extends upward from the base 62 to engage the slanted recess 38.

The base 62 includes a connecting protrusion 62b corresponding to a guide protrusion (not shown), formed on an inner wall of the dust chamber 21, for removably mounting the base 62 in the dust chamber 21. The base 62 also has a hole 62a formed therein. The hole 62a receives the rotary pin 61c of the fixing member 61.

Accordingly, when the user turns the rotary handle 61b of the fixing member 61 in a predetermined direction (for example, a counterclockwise direction as shown in Figure 5A), the fixing member 61 pivots about the rotary pin 61c, and the protrusion 61a moves along the slanted recess 38. As a result, as shown by the dotted line in Figure 6, the dust barrel 37 is lowered to a position whereby the dust barrel 37 is disengaged from the cyclone body 31.

Although not shown, it will be appreciated that the locking/unlocking means 60 can be formed in various designs.

The operation of the upright-type vacuum cleaner, constructed as above according to the preferred embodiment of the present invention, will be described below.

Firstly, when the motor of the motor driving chamber 22 is operating, a suction force is generated at the suction brush 50. The suction force enables the suction brush 50 to draw ambient air and contaminants (such as dust) on the cleaning surface into the cyclone body 31, through the inflow path 25. The air is guided through the inflow path 32a in a generally diagonal direction, along the inner circumference of the cover 34, forming a vortex of air. The centrifugal force of the vortex of air separates the contaminants and dust from the air. The contaminants and dust pass along the spiral surface 35 and are discharged to the dust barrel 37. Such separated contaminants and dust are received and collected in the dust barrel 37. The spiral surface 35 of the cover 34 prevents a backflow of the contaminants and dust from re-entering the cover 34.

Meanwhile, the air (from which contaminants and dust have been substantially removed) is passed through the fine holes of the grille 33 of the head portion 32, and discharged through the discharge pipe 32b. The air then flows through the discharge pipe 32b and the discharge path 26 into the filter casing 43 of the filter chamber 23. In the filter casing 43, fine particles (such as fine dust particles) in the air, which were not separated by the cyclone dust collecting apparatus 30, are filtered out at the air filter 41, and the clean air is drawn into the motor driving chamber 23, and discharged to the outside environment.

The process of removing and re-inserting the dust barrel 37 will now be described.

When the dust barrel 37 is full of contaminants and dust and so requires emptying, the user holds the handle 61b of the fixing member 61 and turns the fixing member in a counterclockwise direction, i.e. from the position shown in Figure 5A to that shown in Figure 5B. Accordingly, the protrusion 61a of the fixing member 61 is moved along the slanted recess 38 from the centre region thereof, to the outer edge of the dust barrel 37. As described above, since the depth of the slanted recess 38, increases from the centre region, to the outer edge of the dust barrel 37, when the protrusion 61a of the

fixing member 61 reaches the end of the slanted recess 38 adjacent to the outer edge of the dust barrel 37, the dust barrel 37 is lowered and thus separated from the cyclone body 31.

The user then pulls the handle 39 of the dust barrel 37 to remove the dust barrel 37 from of the dust chamber 21, and disposes of contaminants and dust that have collected in the dust barrel 37.

In order to clean the interior of the dust chamber 21, the user can pull out the base 62, together with the dust barrel 37 and the fixing member 61.

In order to re-insert the dust barrel 37 in the dust chamber 21, the user mounts the base 62 in the dust chamber 21, and then mounts the fixing member 61 on the base 62, by aligning and inserting the rotary pin 61c to the hole 62b of the base 62. The user then aligns the protrusion 61b of the fixing member 61, with the slanted recess 38, and mounts the dust barrel 37 on the fixing member 61.

The user then holds the handle 61b and turns the fixing member in a clockwise direction, i.e. from the position shown in Figure 5B to that shown in Figure 5A. Accordingly, by moving the protrusion 61 along the slanted recess 38, the dust barrel 37 is raised so as to connect with the cyclone body 31.

The above-described upright-type vacuum cleaner simplifies disposal of collected contaminants and dust since the user does not have to separate the entire cyclone dust collecting apparatus 30 from the dust chamber 21. Instead, the user only has to separate the dust barrel or receptacle, which actually holds the contaminants and dust, from the cyclone dust collecting apparatus 30.

CLAIMS

1. An upright-type vacuum cleaner, comprising:

a cleaner body having an upper dust chamber, a lower motor driving chamber housing a motor, an air inflow path, and an air outflow path interconnecting the upper dust chamber and the lower motor driving chamber;

a cyclone body mounted in an upper portion of the dust chamber and connected to the air inflow path and the air outflow path;

a dust barrel removably mounted to a lower side of the cyclone body;

a suction brush mounted on a lower portion of the cleaner body and arranged to be movable along a surface to be cleaned; and

fine dust filtering means removably disposed in the air outflow path.

2. A vacuum cleaner according to claim 1, wherein the cyclone body comprises:

a cover comprising an open end and a closed end, a contaminant discharge port being formed on the closed end; and

a head portion including an air inflow pipe for connection to the air inflow path, the air inflow pipe being arranged to guide air in a generally diagonal direction with respect to the cover, the head portion further including an air outflow pipe having one end connected to a grille, the grille extending towards the closed end of the cover and being connected to the air outflow path.

3. A vacuum cleaner according to claim 2, wherein the closed end of the cover is formed as a spiral wall defining the discharge port.

4. A vacuum cleaner according to any preceding claim, wherein the dust barrel is substantially cylindrical in shape and has an open end and a closed end, the open end being arranged to align with a closed end of the cyclone body.

5. A vacuum cleaner according to any preceding claim, wherein the dust barrel includes a handle formed on a sidewall thereof.

6. A vacuum cleaner according to any preceding claim, further comprising locking/unlocking means for connecting or separating the dust barrel to or from a closed end of the cover of the cyclone body by raising or lowering the dust barrel in the dust chamber.

7. A vacuum cleaner according to claim 6, wherein the locking/unlocking means comprises:

a slanted surface formed on the closed end of the dust barrel, the slanted surface extending in a curve and gradually increasing in depth from a centre region of the dust barrel, to an outer edge region of the dust barrel;

a fixing member including a rotary pin formed proximate a first end, a handle located at a second end, and a protrusion located between the first and second ends, the protrusion being received in, and movable along, the slanted surface; and

a base removably mounted in the dust chamber, the base having a hole formed therein for receiving the rotary pin and for supporting movement of the fixing member with respect to the slanted surface.

8. An upright-type vacuum cleaner comprising:

a cleaner body including a dust chamber, a motor driving chamber, an air inflow path, and an air outflow path, the air outflow path connecting the dust chamber with the motor driving chamber;

a suction brush pivotally coupled to the cleaner body;

a cyclone body mounted in the dust chamber, the cyclone body being in communication with the air inflow path and the air outflow path, and including a head portion and a cover, the head portion including a grille extending toward a closed end of the cover, the closed end of the cover having a spiral surface forming a contaminant discharge port; and

a removable dust barrel coupled to the closed end of the cyclone body.

9. A vacuum cleaner according to claim 8, wherein the cover of the cyclone body, and the dust barrel, are substantially cylindrical in shape.

10. A vacuum cleaner according to claim 8 or claim 9, wherein the dust barrel has a handle formed on an outer sidewall thereof.

11. A vacuum cleaner according to any of claims 8 to 10, wherein a curved, slanted surface is formed on a closed end of the dust barrel, the slanted surface extending from a centre region of the closed end, to an outer edge region of the dust barrel, the slanted surface gradually increasing in depth, wherein the vacuum cleaner further comprises a connection assembly for connecting the dust barrel to the cyclone body, the connection assembly including:

a fixing member having a first end and a second end, the fixing member including a pin located proximate the first end, a handle at the second end, and a protrusion located between the first and second ends, the protrusion extending upwards and being received in the slanted recess of the dust barrel; and

a base removably mounted in the dust chamber, the base having a hole formed therein for receiving the pin of the fixing member.

12. A vacuum cleaner according to any of claims 8 to 11, further comprising a fine dust filter located in the air outflow path.

13. An upright-type vacuum cleaner, comprising:

a cleaner body housing a cyclone body and a particle receptacle;

a suction port for movement across a surface to be cleaned;

a motor for generating a suction force at the suction port and interconnected to the cyclone body by means of an inlet channel and an outlet channel, wherein the motor and the inlet channel are arranged to cause air and particles to be drawn from the suction port into the cyclone body via the inlet channel, wherein the cyclone body is arranged substantially to separate the particles from the air for collection in the particle receptacle, wherein the outlet channel is arranged to expel the air from the cyclone body, and wherein the particle receptacle is detachable from the cyclone body whilst the cyclone body is housed within the cleaner body.

14. A vacuum cleaner according to claim 13, further comprising displacement means for causing detachment of the particle receptacle from the cyclone body by means of moving the particle receptacle between a first position in which the particle receptacle is in communication with the cyclone body, and a second position in which particle receptacle is separated from the cyclone body.

15. A vacuum cleaner according to claim 14, wherein the displacement means is situated below the particle receptacle and comprises a lever, movement of which causes the particle receptacle to move in a reciprocal manner along the major axis of the cleaner body. .

16. A vacuum cleaner according to claim 15, wherein the lever is movable about a first axis which is different from the major axis of the cleaner body.

17. A vacuum cleaner according to claim 15 or claim 16, wherein the particle receptacle includes a sloping recess formed in a lower surface thereof, the lever comprising a protrusion for being inserted within the sloping recess.

18. An upright-type vacuum cleaner, constructed and arranged substantially as hereinbefore described and shown in Figures 2 to 6 of the drawings.